10/1/93

PA-ST Program

5E0301-A0102

3/31/86

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

EPA

I IDENTIFICATION

01 STATE: IL | 02 SITE NUMBER: 980899132

II SITE NAME AND LOCATION

01 SITE NAME (Legal, common or descriptive name of site)	02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER				
Saxton Coal Co	Sect 8&9 T10S.-R 7E.				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
Mountain Townshp	IL	62946	Saline	165	22
09 COORDINATES LATITUDE: 37 40 23.0	LONGITUDE: 088 26 54.0	Rudement (274)			

10 DIRECTIONS TO SITE (Starting from nearest public road)
See Attached Map - NW¼ of the NW¼ of Sect 9 and the NE¼ of the NE¼ of Sect 8

III RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
R. L. Burns Corp	P.O. Box 33708		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
San Diego	CA	92103	( )
07 OPERATOR (If known and different from owner)	**08 STREET** (Business, mailing, residential)		
Robert James	Corner of Poplar & Gum		
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
Harrisburg	IL	62946	( )

13 TYPE OF OWNERSHIP (Check one)
☑ A PRIVATE ☐ B FEDERAL _____ (Agency name) ☐ C STATE ☐ D COUNTY ☐ E MUNICIPAL
☐ F OTHER _____ (Specify) ☐ G UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A RCRA 3001 DATE RECEIVED ___/___/___ (MONTH DAY YEAR) ☐ B UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED ___/___/___ (MONTH DAY YEAR) ☑ C NONE

IV CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES DATE ___/___/___ (MONTH DAY YEAR)
☑ NO

BY (Check all that apply)
☐ A EPA ☐ B EPA CONTRACTOR ☐ C STATE ☐ D OTHER CONTRACTOR
☐ E LOCAL HEALTH OFFICIAL ☐ F OTHER _____ (Specify)
CONTRACTOR NAME(S) _____

02 SITE STATUS (Check one)
☐ A ACTIVE ☐ B INACTIVE ☑ C UNKNOWN

03 YEARS OF OPERATION
BEGINNING YEAR | ENDING YEAR ☑ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT KNOWN OR ALLEGED
Heavy Metals (Toxic/Persistant/Soluble)
Acids (Corrosive/Soluble)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
Surface Water (Population/Environment)
Ground Water (Population/Environment)

V PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A HIGH (Inspection required promptly) ☐ B MEDIUM (Inspection required) ☑ C LOW (Inspect on time available basis) ☐ D NONE (No further action needed; complete current disposition form)

VI INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)			03 TELEPHONE NUMBER
				( )
04 PERSON RESPONSIBLE FOR ASSESSMENT	**05 AGENCY**	**06 ORGANIZATION**	**07 TELEPHONE NUMBER**	**08 DATE**
Richard M. Lange	IEPA	RPM/PA-SI	(217) 782-6761	3 24 86 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I IDENTIFICATION

01 STATE	02 SITE NUMBER
ILD	980899132

II. WASTE STATES QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- A SOLID
- B POWDER FINES
- C SLUDGE
- D OTHER ___ (Specify)
- E SLURRY
- F LIQUID
- G GAS

02 WASTE QUANTITY AT SITE

Measures of waste quantities must be independent

- TONS
- CUBIC YARDS: Unk
- NO OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)

- A TOXIC
- B CORROSIVE
- C RADIOACTIVE
- D PERSISTENT
- E SOLUBLE
- F INFECTIOUS
- G FLAMMABLE
- H IGNITABLE
- I HIGHLY VOLATILE
- J EXPLOSIVE
- K REACTIVE
- L INCOMPATIBLE
- M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS	Unknown		Mine Spoils
BAS	BASES			
MES	HEAVY METALS	Unknown	"	"

IV HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

Unknown

V FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references e.g. state files, sample analysis, reports)

(SIA; IL State Reclamation Plan for Abandoned Mined Land)
(County Plats; SIA # 00027 Cnty 165; AML. Tr # 194-199 M # 38)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I IDENTIFICATION	
01 STATE	02 SITE NUMBER
ILD	980899132

II HAZARDOUS CONDITIONS AND INCIDENTS

01 ✓ A GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED Udt
02 ☐ OBSERVED (DATE _____) ✓ POTENTIAL ALLEGED
04 NARRATIVE DESCRIPTION

Rural pop dependent on Gr.W; Sparce

01 ✓ B SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED Udt.
02 ☐ OBSERVED (DATE _____) ✓ POTENTIAL ALLEGED
04 NARRATIVE DESCRIPTION

Most public supplies utilize surface water as source of Supply Extensive Recreational Uses of Surface water.

01 ☐ C CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ D FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ E DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ F CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED _____ (Ac es)
02 ☐ OBSERVED (DATE _____) POTENTIAL ALLEGED
04 NARRATIVE DESCRIPTION

01 ✓ G DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED Udt
02 ☐ OBSERVED (DATE _____) ✓ POTENTIAL ALLEGED
04 NARRATIVE DESCRIPTION

See A & B above

01 ☐ H WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ I POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I IDENTIFICATION
01 STATE: ILD | 02 SITE NUMBER: 980 899 132

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☑ K DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
Extensive Sport fishing industry in this area.

01 ☑ L CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Consumption of sport fish

01 ☐ M UNSTABLE CONTAINMENT OF WASTES (Spills runoff standing liquids leaking drums) — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 ☐ N DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O CONTAMINATION OF SEWERS STORM DRAINS WWTPs — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN POTENTIAL OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: Unk.

IV COMMENTS

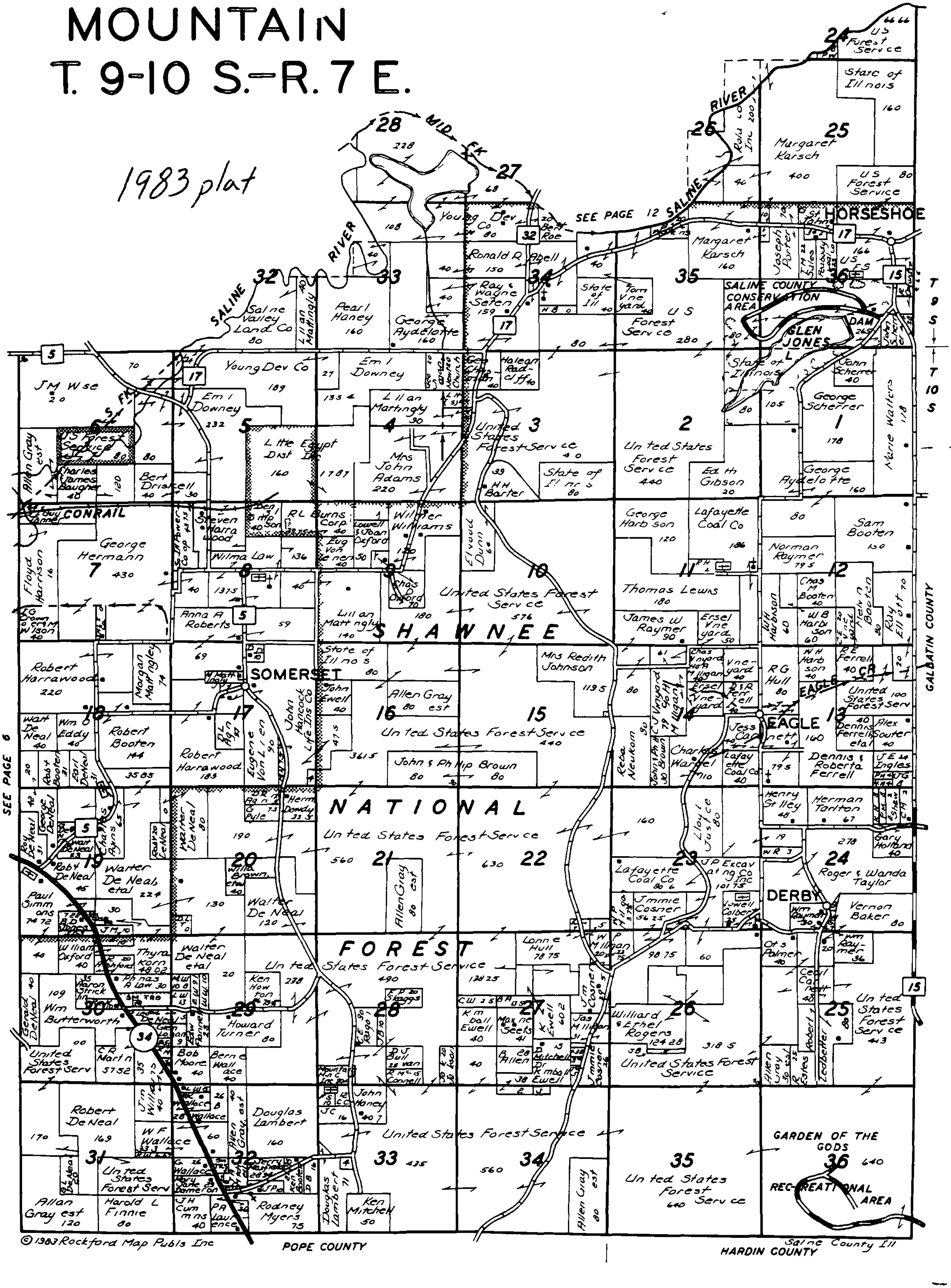
V SOURCES OF INFORMATION (Cite specific references e g state files sample analysis reports)

gs Part 2 Sect VI

EPA FORM 2070-12 (7-81)

MOUNTAIN
T. 9-10 S.-R. 7 E.

1983 plat



POPE COUNTY

HARDIN COUNTY

Saline County Ill

EXECUTIVE SUMMARY

This site has been placed in the ERRIS/CERCLIS data base as a result of its identification during the Surface Impoundment Assessment (SIA) Certain other sites have recently been added to CERCLIS because of their similar ownership, operator, or proximity to an identified SIA site The information contained in Section II Site Name and Location items 01 thru 10 may be found to vary from the existing CERCLIS information, the information contained on EPA Form 2070-12 should be used henceforth as more accurately identifying the site name and location

Information to complete Form 2070-12 has been acquired from a number of sources including, but not limited to, SIA printouts, CERCLIS, the Illinois State Reclamation Plan for Abandoned Mined Land, and county plat books Considering the age of certain information, and the lack of specificity, some interpretation and judgement has been required in reporting all information Where duplication of material with a moderate confidence level occurred, that information has been reported Where conflicting data has appeared, the most current information with the highest degree of confidence has been used

The materials of major concern at this location, with potential environmental impact, would be gob piles, acid mine drainage, and impoundments to retain mine drainage and coal wash plant process waters Low pH and high iron concentrations have long been associated with mine drainage Iron pyrites and marcasites (FeS_2) constitute approximately 25% of the mineral fraction of Illinois coals and thru a complex oxidation reaction yield H_2SO_4 and $FeSO_4$ providing the sources for low pH and Fe release problems More recent concerns are being raised because of the heavy metal constituents of mine run coal, which are contained primarily in the mineral fraction and removed to the gob pile, with the pyrites, during initial processing

USEPA publication EPA-650/2-74-054 summarizes work done by the Illinois State Geological Survey and raises points of concern for this area of Illinois Pages 33 thru 50 of this report summarize analytical results obtained on four major Illinois coals and fractions of the coals obtained by specific gravity separation techniques Looking at the Herrin #6 coal member, fractions of 1 60 specific gravity and greater, metals are reported in the following ranges

	Low	High		Low	High
As	23 0	244 0 ppm	Ni	76	102 ppm
Cd	4 8	152 0 ppm	Pb	210	2162 ppm
Cr	31	71 0 ppm	Sb	2 8	12 0 ppm
Cu	61	89 0 ppm	Se	6 8	21 0 ppm
Hg	0 68	3 80 ppm	V	60	85 ppm
Mn	74	457 ppm	Zn	570	15170 ppm
Mo	14	215 ppm	Zr	21	32 ppm

Comparing the above information against surface water quality data reported in "Hydrology of Area 35, Eastern Region, Interior Coal Province, Illinois and Kentucky" published by the U S Dept of Interior, Geologic Survey, open file report #81-403, portions of which are attached, one begins to grasp the potentials for environmental degradation presented by mine drainage In the USGS study, the maximum concentration of Ni found upstream of mining activity was 10 ppb, whereas downstream, the maximum value was 630 ppb Mean values of Ni found were 6 1 ppb upstream, and 113 ppb downstream The values for Ni represent a 63 fold increase of downstream maximum over the upstream maximum Increases in the maximum concentrations of Cu were 27 fold, Zn at 32 fold, Mg at 11 9 fold, and Al at 2,238 fold increase

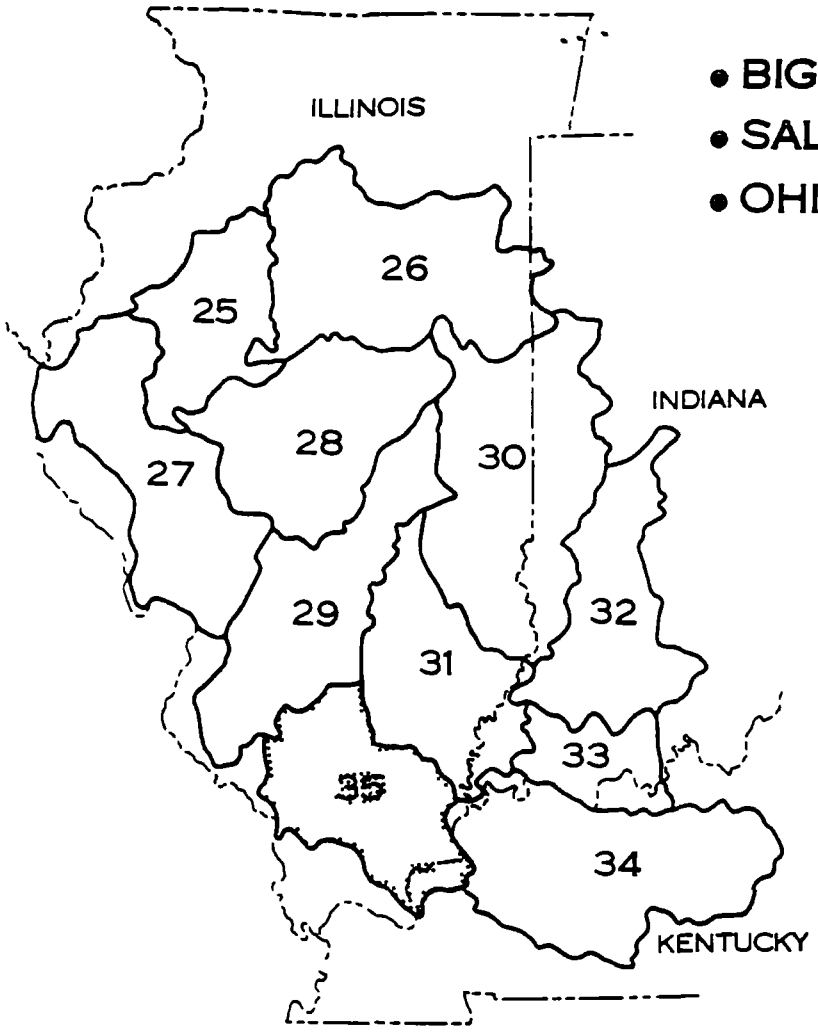
The Illinois Department of Mines and Minerals and numerous private firms are involved in reclamation/remediation activities at a number of these sites It is entirely possible that this site presents no hazard at this time, but the reverse is also possible There is no evidence to indicate waste disposal, other than that associated with mine activity A low priority has been assigned and site inspection activity should be considered on a representative selection of these sites on a time available basis A higher priority was not assigned because of the regional scope of these sites and the high probability of existing remedial activities at high pollution potential sites

RML tk 4/8/49(3/21/86)

Attachment

Richard Long

HYDROLOGY OF AREA 35, EASTERN REGION, INTERIOR COAL PROVINCE, ILLINOIS AND KENTUCKY



- BIG MUDDY RIVER
- SALINE RIVER
- OHIO RIVER

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 81-403

HYDROLOGY OF AREA 35, EASTERN REGION, INTERIOR COAL PROVINCE, ILLINOIS AND KENTUCKY

BY

E E ZUEHLS, G L RYAN, D B PEART, AND K K FITZGERALD

U S GEOLOGICAL SURVEY
WATER-RESOURCES INVESTIGATIONS 81-403

URBANA ILLINOIS
MAY 1981

IRON CONCENTRATIONS ARE HIGHER DOWNSTREAM THAN UPSTREAM OF MINING

Dissolved iron ranged from 0 to 640 micrograms per liter (µg/L) at sites upstream of mining and from 0 to 1,100,000 µg/L at sites downstream of mining Total recoverable iron ranged from 100 to 31,000 µg/L at the upstream sites and from 0 to 2,100,000 µg/L at the downstream sites

Iron is the fourth most abundant element in the Earth's crust with 4 7 percent (Petrucci, 1972) It is an important constituent of the surface and ground waters in this area because of its abundance in the sedimentary rocks of the Pennsylvanian System Under natural conditions, in sedimentary rock and ground water, iron is found primarily in the ferrous form (Fe^{+2}) It is the abundance and the instability of ferrous iron, when exposed to air, that probably influence many chemical reactions downstream of mining Surface mining processes increase the amount of iron available to the system by exposing more surface area of iron bearing minerals to weathering conditions Geologic and erosional factors at sites upstream of mining maintain fairly stable concentrations of iron in streams

At sites upstream of mining, the measured range of concentration for dissolved iron was from 0 to 640 µg/L with a mean of about 110 µg/L At sites downstream of mining, concentrations of dissolved iron ranged from 0 to 1,100,000 µg/L with a mean of about 20,000 µg/L or approximately 20 milligrams per liter (mg/L) (fig 8.2 4-1 and 8.2 4-2 and table 8 2 4-1)

Total recoverable iron for the sites upstream of mining ranged from 100 to 31,000 µg/L with a mean of about 2,400 µg/L Total recoverable iron for the downstream sites ranged from 0 to 2,100,000 µg/L with a mean of about 37 800 µg/L or approximately 38 mg/L (fig 8 2 4 1 and 8 2 4 3 and table 8 2 4-2)

Concentrations of dissolved iron in surface water seldom reach 1 mg/L (American Public Health Association, 1976, p 207) For the upstream sites, the entire range of values is well below this level The surface water of areas downstream of mining sometimes exceeded 1 mg/L of dissolved iron

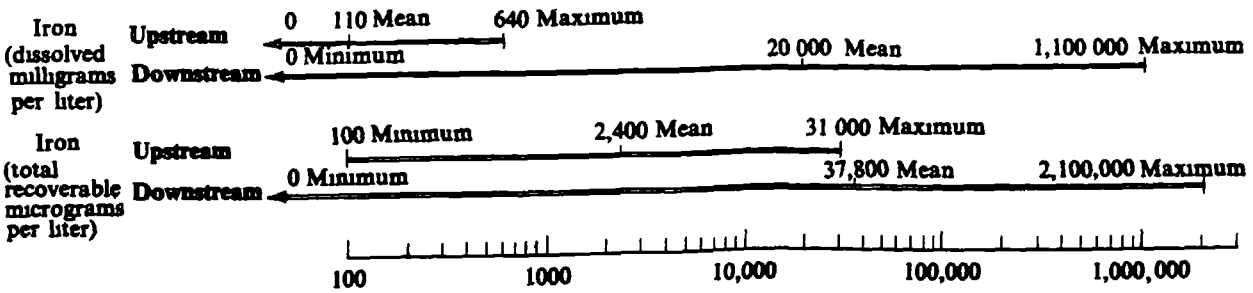


Figure 8.2.4-1 Range of dissolved iron and total recoverable iron concentrations measured at sites upstream and downstream of mining

CONCENTRATIONS OF DISSOLVED AND TOTAL RECOVERABLE MANGANESE ARE HIGHER DOWNSTREAM THAN UPSTREAM OF MINING

Mean values of dissolved and total recoverable manganese concentrations were approximately 7 to 10 times greater at the sites downstream of mining than at the upstream sites

Manganese is a common element widely distributed in igneous rocks and soils but its total abundance in the Earth's crust is small enough to put it in the list of "trace" elements Manganese and iron have similar electronic configurations and behave similarly Because manganese has a lower affinity for oxygen, it stays in solution longer than iron (Rankama and Sahama, 1950)

For the sites upstream of mining in the study area the measured concentrations of dissolved manganese ranged from 30 to 4 900 micrograms per liter (μg/L) with a mean of about 560 μg/L This compares to a measured range of 20 to 91,000 μg/L and a mean of about 4,100 μg/L for the sites downstream of mining (fig 8 2 5 1 and 8 2 5 2 and table 8 2 5 1)

Total recoverable manganese for the sites upstream of mining ranged from 30 to 3 900 μg/L with a mean of about 570 μg/L Downstream of mining the measured values of total recoverable manganese ranged from 20 to 240,000 μg/L with a mean of about 5,590 μg/L (fig 8 2 5 1 and 8 2 5 3 and table 8 2 5 2)

According to Rankama and Sahama (1950) the Mn Fe ratio in natural carbonate waters is about 5 1 This ratio is approximated by the upstream data for which the mean dissolved manganese value was 560 μg/L and the mean dissolved iron value was 110 μg/L The mean values of dissolved manganese and dissolved iron for the downstream sites are 4 100 μg/L and 20 000 μg/L, respectively, resulting in a Mn Fe ratio of 0 21 1 This decrease in the Mn Fe ratio reflects the relatively large upstream to downstream increase in iron concentrations compared to manganese concentrations

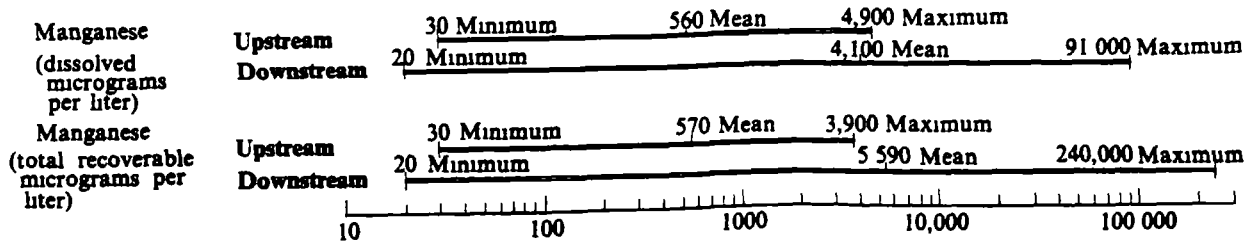


Figure 8 2.5-1 Range of dissolved and total recoverable manganese concentrations measured at sites upstream and downstream of mining

SULFATE CONCENTRATIONS ARE HIGHER DOWNSTREAM THAN UPSTREAM OF MINING

Concentrations of sulfate ranged from 12 to 500 milligrams per liter (mg/L) at the sites upstream of mining and from 15 to 12,000 mg/L at the downstream sites Sulfate concentrations at downstream sites can be estimated using the equation SULFATE = 0 64 (SPECIFIC CONDUCTANCE) – 210

Sulfur occurs in the coal and associated strata as metallic sulfides, mainly in the form of pyrite (FeS_2) and marcasite (FeS_2), which are also sources of ferrous iron When oxidized, the sulfides yield the sulfate ion and ferric oxide At the sites upstream of mining, the sulfates are probably introduced to the water from stream cuts through exposed Pennsylvanian rocks This would be a fairly steady source of sulfate with erosion and oxidation contributing to the dissolution of sulfate materials

The measured concentrations of sulfate at the upstream sites range from 12 to 500 mg/L with a mean value of 140 mg/L for all the observations at all the upstream sites The upstream sulfate data contrast sharply with sulfate data for the downstream sites (table 8 2 6 1) The mean downstream sulfate value of 760 mg/L is larger than any value at an upstream site, and the maximum value of 12,000 mg/L is 24 times that of the largest value found at an upstream site (fig 8 2 6 1) The minimum sulfate value of 15 mg/L at the downstream sites is approximately the same as the minimum at the upstream sites

The contrast in sulfate concentrations between the sites upstream and downstream of mining, as seen in figure 8 2 6 2, suggests the higher sulfate concentrations downstream of mining probably result from the increased exposure of sulfide bearing minerals to weathering in the mined area Toler (1980) related annual sulfate loads to the area of surface mines as a percentage of total drainage area and showed that in southern Illinois sulfate can be used as an indicator of mine drainage (fig 8 2 6 3)

For the sites downstream of mining a comparison was made between sulfate concentrations and specific conductance There is a strong correlation (correlation coefficient = 0 93) between the two variables in the range for specific conductance from 400 to 5,000 µmho/cm at 25°C By using the regression equation represented by the line on the accompanying illustration (fig 8 2 6-4), sulfate concentrations can be estimated at sites in the area downstream of mining from measurements of specific conductance between 400 and 5,000 µmho/cm at 25°C

ACIDITY VALUES ARE HIGHER DOWNSTREAM THAN UPSTREAM OF SURFACE MINING AREAS

Only one site upstream of mining had measurable acidity Twenty-one sites downstream of mining had acidity values ranging from 0 1 to 99 milligrams per liter (mg/L) as the hydrogen ion (H^+) Alkalinity values ranged from 0 to 390 mg/L as calcium carbonate ($CaCO_3$) at the upstream sites and from 0 to 520 mg/L as $CaCO_3$ at the downstream sites

Acidity is defined as "the quantitative capacity of an aqueous media to react with hydroxyl ions" and is expressed in mg/L as the hydrogen ion (H^+) It is an important parameter to measure in areas affected by surface mining because when present in significant amounts it is an indication that acid forming materials are interacting with the surface water Alkalinity is defined as the capacity of the solution to react with hydrogen ions and is commonly reported in mg/L as $CaCO_3$ even though $CaCO_3$ may not be the source of or be responsible for all the buffering capability

One site upstream of mining had measurable acidity Twenty three of forty-eight sites downstream of mining had measurable acidity that ranged from 0 1 to 99 mg/L as H^+ (fig 8 2 7 1 and 8 2 7 2 and table 8 2 7 1)

Alkalinity at sites upstream of mining ranged from 0 to 390 mg/L as $CaCO_3$ with a mean of 92 mg/L as $CaCO_3$ The sites downstream of mining had a range in alkalinity from 0 to 520 mg/L as $CaCO_3$ with a mean of 88 mg/L (fig 8 2 7 1 and table 8 2 7 2)

Although mean values for alkalinity at the upstream and downstream sites are similar (fig 8 2 7 3), variations between sites, especially downstream of mining, are great Surface mining exposes not only the pyrites and marcasites (acid forming materials) but also the limestones (source of $CaCO_3$) of the Pennsylvanian System The variability of alkalinity values at the sites downstream of mining may depend on the amounts of limestone exposed during mining

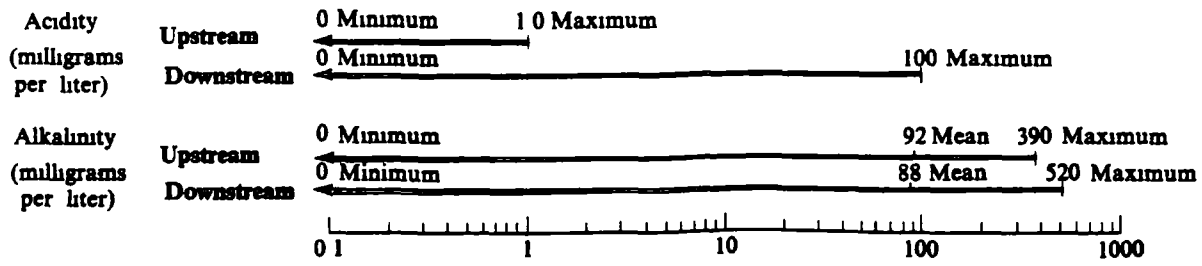


Figure 8 2 7-1 Range of acidity and alkalinity values at sites upstream and downstream of mining

CONCENTRATIONS OF TRACE ELEMENTS VARY IN THE STUDY AREA

Concentrations of many trace elements and other water-quality constituents differed between sites upstream and downstream of surface mining

Concentrations of many dissolved constituents differed between sites upstream and downstream of mining as shown in figure 8 2 8 1 In water, copper, zinc, boron, calcium nickel, magnesium, and aluminum all had higher mean concentrations downstream of mining than upstream Concentrations of carbon dioxide in water and total iron in the bottom material were also higher downstream of mining. Mean concentrations of total manganese in bottom material showed little difference between upstream and downstream sites Dissolved chloride concentrations were less downstream than upstream of mining

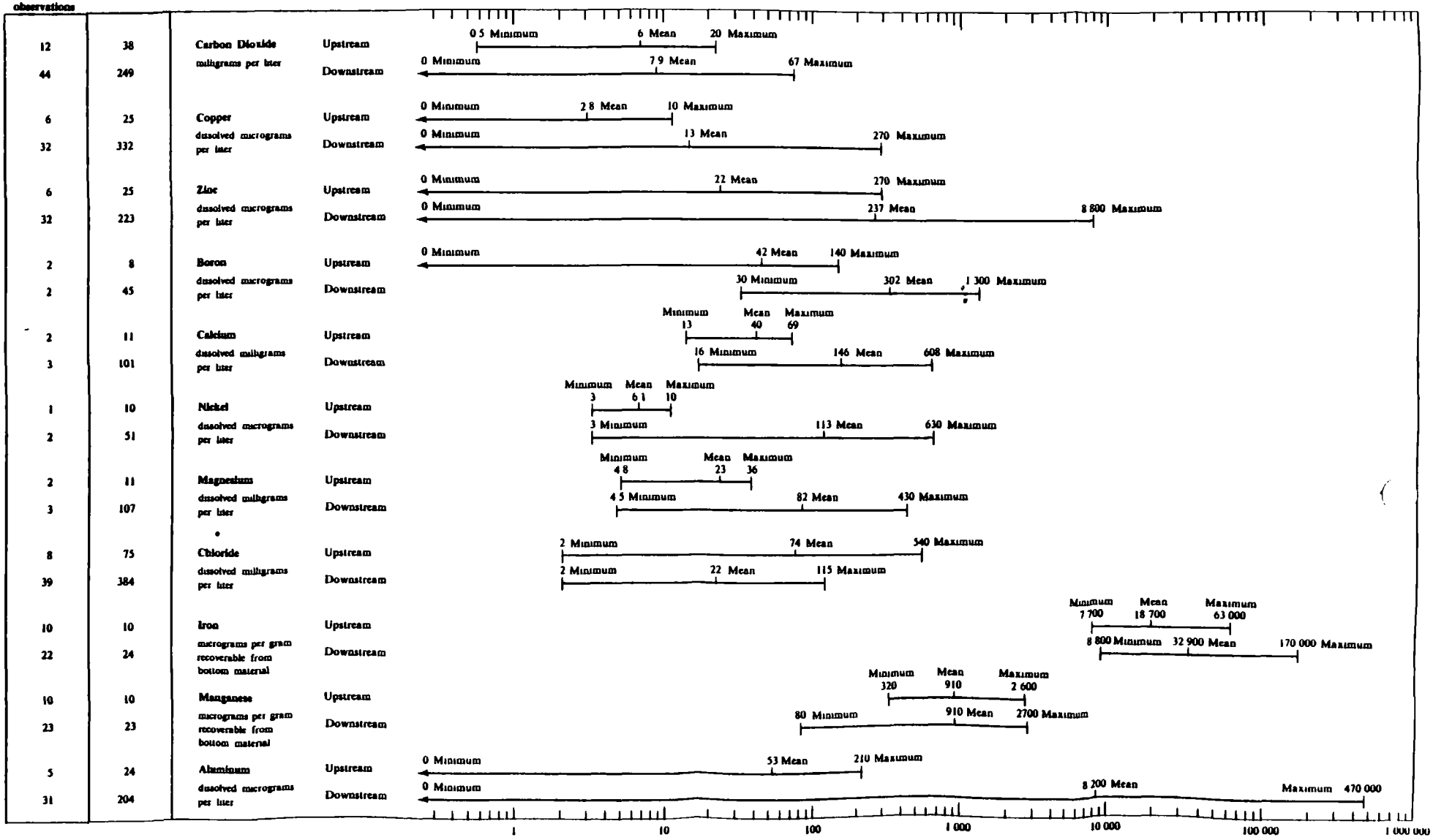


Figure 8.2.8-1 Range of concentrations for various constituents at sites upstream and downstream of mining